



(19)

Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11)

**EP 0 738 501 B1**

(12)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention  
of the grant of the patent:  
**24.05.2000 Bulletin 2000/21**

(51) Int Cl.7: **A61B 17/28, A61B 17/32,  
A61B 18/12, A61B 10/00,  
A61B 1/00**

(21) Application number: **95936088.4**

(86) International application number:  
**PCT/JP95/02244**

(22) Date of filing: **02.11.1995**

(87) International publication number:  
**WO 96/14020 (17.05.1996 Gazette 1996/22)**

(54) **ENDOSCOPE OPERATIVE INSTRUMENT**

**MIT ENDOSKOP FUNKTIONIERENDES INSTRUMENT**

**INSTRUMENT FONCTIONNANT AVEC UN ENDOSCOPE**

(84) Designated Contracting States:  
**DE FR GB IT**

(30) Priority: **02.11.1994 JP 26936294**  
**13.04.1995 JP 8828195**

(43) Date of publication of application:  
**23.10.1996 Bulletin 1996/43**

(73) Proprietor: **Olympus Optical Co., Ltd.**  
**Tokyo 151-0072 (JP)**

(72) Inventors:  
• **MATSUNO, Kiyotaka**  
**Hachioji-shi Tokyo 193 (JP)**  
• **SATO, Yukio**  
**301 Tsuda-3-chome-Apartment No. 10 tou**  
**Kodaira-shi Tokyo 187 (JP)**  
• **SADAMASA, Akihito**  
**Olympus-Nishi-Hachioji-Corporas**  
**Hachioji-shi Tokyo 193 (JP)**

• **SHINOZUKA, Minoru**  
**Tokyo 193 (JP)**  
• **YANUMA, Yutaka**  
**New York, NY 11746 (US)**

(74) Representative:  
**Winter, Konrad Theodor, Dipl.-Ing.**  
**Winter, Brandl, Fürniss, Hübner, Röss,**  
**Kaiser, Polte, Kindermann**  
**Partnerschaft**  
**Patent- und Rechtsanwaltskanzlei**  
**Alois-Steinecker-Strasse 22**  
**85354 Freising (DE)**

(56) References cited:  
**EP-A- 0 027 704**  
**WO-A-92/11815**  
**JP-A- 63 145 641**  
**US-A- 5 066 295**  
**WO-A-90/05491**  
**JP-A- 3 195 547**  
**US-A- 4 043 323**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

**EP 0 738 501 B1**

**BEST AVAILABLE COPY  
BEST AVAILABLE COPY**

## Description

### [Technical Field]

[0001] The present invention relates to an endoscopic treatment tool inserted into the body cavity through an endoscope for performing a treatment or the like.

### [Background Art]

[0002] A conventional endoscopic treatment tool such as described above comprises at the forward end thereof a treatment section for treating or performing biopsy on a vital tissue or holding the tissue, which treatment section is so structured as to open or otherwise operate similarly taking advantage of the spring characteristics or a link mechanism.

[0003] Such a tool has the disadvantage that the treatment section cannot be operated in optimum direction with respect to a foreign matter or the tissue on which biopsy or the holding operation is to be performed, with the result that the tissue and foreign matters cannot be successfully treated.

[0004] In view of this, JP-A-55-109501 discloses a treatment tool comprising a sheath section formed of a multi-turn coil or a multiple coils inserted in the channel of the endoscope for connection with the treatment section, which sheath section is rotated on the operator's side so that the treatment section can be rotated in the desired direction and thus can be operated in the optimum direction.

[0005] In the case where the sheath section is inserted into the channel of the endoscope and rotated, however, the friction resistance between the outer periphery of the sheath section and the inner wall of the channel causes a skip or like irregularities in rotation, thereby sometimes making it impossible to transmit the turning effort positively to the treatment section at the forward end.

[0006] Also, forming a sheath section of a multi-turn coil or multiple coils reduces the flexibility of the sheath section. In the case where a high efficiency in rotation characteristics is sought, the insertion characteristic of the sheath section with respect to the channel is extremely deteriorated, thereby making it difficult to achieve the desired rotation characteristics. Especially, a multi-turn coil has the disadvantage that it cannot be rotated depending on the direction in which the coil is wound.

[0007] The sheath section of multiple coils, on the other hand, which is formed of several layers of coils overlapped on each other, leads to the disadvantage of an often increased diameter compared with a single coil. A sheath section formed of a multi-turn coil is a problem when considering the fact that the sheath section and the treatment section at the forward end thereof are led into the body cavity using the limited space defined by the channel of the endoscope.

[0008] Document EP 0 027 704 discloses a surgical snare apparatus (as an endoscopic treatment tool) being adapted to be led into the vital body through the endoscope channel and to operate a treatment section by transmitting the operating force of an operating section at the operator's side to the treatment section. The apparatus comprises a tubular sheath adapted to be inserted into the endoscope channel, rotative operation means arranged on said operating section for rotatively operating said treatment section, and a flexible member/snare wire (as an operating wire) rotatably inserted into said sheath for coupling said treatment section with said rotative operation means and having a torque transmissivity capable of transmitting the rotation torque from the rotative operation means to said treatment section.

### [Disclosure of the Invention]

[0009] The present invention has been developed in view of the above-mentioned situations, and the object thereof is to provide an endoscopic treatment tool which enables the placement of a variety of treatment sections, also including a clip having the inherent tendency of widening open through an endoscope.

[0010] In order to solve the above-mentioned problem, there is provided an endoscopic treatment tool according to claim 1.

[0011] In this configuration, rotation of the operating wire by operating the rotative operation means rotates the forward-end treatment section with the rotation of the operating wire, thereby making it possible to orient the treatment section in a given direction. In this case, since the operating wire is inserted into the tubular sheath, the rotation of the operating wire and the resulting friction resistance between the inner wall of the endoscope channel and the operating wire causes no skip or other irregularities in rotation, and therefore the turning effort due to the rotative operation means can be positively transmitted to the forward-end treatment section.

### [Brief Description of Drawings]

[0012] FIG. 1A is a longitudinal sectional view of the forward end of a clip device according to a first embodiment of the invention, and FIG. 1B is a cross sectional view showing the forward end of the clip device.

[0013] FIG. 2 is a perspective view of the operating section of a clip device.

[0014] FIG. 3A is a perspective view of a hook section, and FIG. 3B is a sectional view taken in line IIIB-III B in FIG. 3A.

[0015] FIG. 4 is a side sectional view showing a configuration of an operating tube.

[0016] FIG. 5A is a plan view of a clip, and FIG. 5B is a side view of the clip.

[0017] FIG. 6 is a sectional view of an operating unit of the clip device.

[0018] FIG. 7 is a perspective view showing a configuration of the operating unit proper and a lid member.

[0019] FIG. 8 is a perspective view showing a button for releasing a fixed state.

[0020] FIG. 9 is a longitudinal sectional view showing the operating wire in coupled state with a wire support.

[0021] FIG. 10 is a longitudinal sectional view of the release button in an assembled state.

[0022] FIG. 11 is a perspective view showing a configuration of the base end of the operating wire.

[0023] FIG. 12 is a longitudinal sectional view of a ratchet release button in an assembled state.

[0024] FIG. 13 is a perspective view showing a cover member of a second slider.

[0025] FIG. 14 is a sectional view showing the manner in which the tissue is bound using a clip device.

[0026] FIG. 15A is a sectional view of a clip retained in the tissue to be bound, FIG. 15B a cross sectional view of a clip device after a clip is retained, and FIG. 15C a longitudinal sectional view of a clip device after a clip is retained.

[0027] FIG. 16 is a sectional view showing an operating unit of a clip device according to a second embodiment of the invention.

[0028] FIG. 17 is a front sectional view showing the state of a caulked portion of the base end of the operating wire.

[0029] FIG. 18 is a side sectional view showing a caulked portion of the base end of the operating wire.

[0030] FIG. 19 is a diagram showing the essential parts of a caulking tool.

[0031] FIGS. 20A and 20B are sectional views of a second slider.

[0032] FIG. 21 is a longitudinal side sectional view showing a coupling structure of the operating unit of a clip device according to a third embodiment of the invention.

#### [Best mode of Carrying Out the Invention]

[0033] Embodiments of the invention will be described below with reference to the drawings.

[0034] FIGS. 1 to 15 show a first embodiment of the invention. FIGS. 1A and 1B show the forward end of a clip device as an endoscopic treatment tool, and FIG. 2 an operating unit 4 on the operator's side of the tool. As shown in FIGS. 1A and 1B, this clip device includes a clip device proper 1 and a cassette-type clip unit 2 mounted replaceably on the clip device proper 1. In these drawings, numeral 3 designates a lead tube for the clip device proper 1. This lead tube 3 is formed of a flexible material such as ethylene tetrafluoride resin or the like and is adapted to be inserted into a body cavity using, for example, the channel of the endoscope.

[0035] As shown in FIG. 2, the operating unit 4 of the clip device proper 1 includes an operating unit proper 5, a first slider 13 mounted axially slidably on the operating unit proper 5, and a second slider 36 axially slidable with

respect to the first slider 13 through a ratchet mechanism. The base end of the lead tube 3 is coupled to the operating unit proper 5 as described later.

[0036] As shown in FIG. 1, a flexible operating tube 28 having a coupling ring 29 of a stainless-steel short tube fixedly mounted at the forward end thereof is retractively inserted in the lead tube 3. As described later, this operating tube 28 is formed of densely-wound stainless-steel wires, for example, the base end of which is coupled to the first slider 13 of the operating unit 4. With the operation of the first slider 13, the operating tube 28 is caused to extend or retract in the lead tube 3 and also is adapted to protrude or withdraw through the forward-end opening of the lead tube 3.

[0037] An operating wire 33 having a torque transmissivity is retractively inserted in the operating tube 28. This operating wire 33 is coated with fluororesin or the like material having a superior slidability over the entire length thereof, and the superior operability of the operating wire 33 is thereby maintained.

[0038] As shown in FIG. 1, the forward end of the operating wire 33 has mounted thereon a hook 30 adapted to replaceably engage a coupling plate 37 of the cassette-type clip unit 2. FIG. 3A is a perspective view showing the hook 30 in enlarged form. As shown, the hook 30 has formed thereon a recess 30a on one side of the forward-end solid-cylindrical portion thereof. A pin 42 is erected from the recess 30a perpendicularly to the length of the hook 30. This pin 42 includes a circular head 42a and a neck 42b smaller in diameter than the head 42a. By the way, FIG. 3B is a sectional view taken in line IIIB-IIIIB in FIG. 3A.

[0039] A hole 40 coaxial with the longitudinal center axis of the hook 30 is formed in the base end of the hook 30. An operating wire 33 is inserted into and fixed by a fixing material or the like in the hole 40.

[0040] The hook 30 is formed by metal injection molding. This is because a metal injection mold is superior in tenacity (toughness) to a machine-ground product, and should a force more than necessary be imposed on it, the mold is only deformed but not broken off from the wire 33.

[0041] The lead tube 3 is desirably transparent so that the operating tube 28 inserted in the lead tube 3 is visible by endoscope from outside the lead tube 3. The clearance between the lead tube 3 and the operating tube 28 is preferably about 0.1 to 0.5 mm over the whole periphery. The reason is that an excessively large clearance would deform or buckle the tubes 3 and 28 while an excessively small clearance would increase the sliding resistance between the tubes 3 and 28.

[0042] As shown in FIG. 4, the operating tube 28 includes a forward-end coil 31 formed of a densely-wound stainless-steel wire of a rectangular section and having such an inner diameter that the hook 30 can be inserted in it, and a base-end coil 32 connected to the forward-end coil 31 by laser welding or the like process and having a densely-wound stainless-steel wire of a circular

section. In this way, the forward-end coil 31 is formed flat in view of the need of securing such an inner diameter that the hook can be inserted in it. The flat-coil structure, though thin in thickness, assures a durability against expansion and contraction and a high tenacity.

[0043] The clearance between the base-end coil 32 of the operating tube 28 and the operating wire 33 inserted therein is set at a minimum. This clearance is desirably about 0.05 to 0.2 mm. This is in order to prevent the operating wire 33 from zigzagging within the base-end coil 32 and thereby adversely affecting the force-transmitting capability.

[0044] As shown in FIGS. 5A and 5B, the clip unit 2 includes a clip 45, a coupling plate 37 constituting a coupling member removably coupled to the clip 45, and a clip-fastening ring 46.

[0045] The clip 45 is constructed of a thin band plate of stainless steel bent at the center thereof with the bent portion thereof making up a base end 47. A pair of loosely-fitted portions 48a, 48b spaced wider than the inner diameter of the clip-fastening ring 46 are extended from the base end 47. Further, the loosely-fitted portions 48a, 48b are so extended that arms 49a, 49b intersect each other. Furthermore, the forward end of the arms 49a, 49b forms holding sections 50a, 50b bent toward each other. The arms 49a, 49b of the clip 45 have a tendency to open the holding sections 50a, 50b.

[0046] On the other hand, the coupling plate 37 is formed by punching a thin band plate of stainless steel, and has an end thereof formed with a J-shaped hook removably engaging the base end 47 of the clip 45 as shown in FIG. 5A. Also, an engaging hole 52 is formed to removably engage the pin 42 (FIGS. 1A, 1B and 3A) of the hook 30 in the vicinity of the other end of the coupling plate 37. This engaging hole 52 includes a long hole portion 52a extending lengthwise and a large-diameter hole portion 52b formed at the end of the hole portion 52a nearer to the hook 51. The head 42a of the pin 42 of the hook 30 is formed smaller than the large hole portion 52b of the engaging hole 52 and larger than the width of the hole portion 52a. The neck 42b of the pin 42 is formed smaller in diameter than the width of the long hole portion 52a of the engaging hole 52.

[0047] The clip-fastening ring 46, on the other hand, as shown in FIGS. 1A and 1B, is removably mounted on the coupling ring 29 at the forward end of the operating tube 28. As described later, the clip-fastening clip 46 is fitted to cover the arms 49a, 49b of the clip 45 thereby to close the holding sections 50a, 50b of the clip 45.

[0048] As shown in FIGS. 5A and 5B, an unevenness is formed by a step on the outer peripheral surface of the clip-fastening ring 46. The small-diameter section 46a of the clip-fastening ring 46 formed by this step has an outer diameter smaller than the inner diameter of the coupling ring 29 of the operating tube 28 (FIG. 1) and is coupled by being fitted in the coupling ring 29. Incidentally, the outer diameter of the large-diameter section 46b of the clip-fastening ring 46 is thicker than the inner

diameter of the coupling ring 29.

[0049] Also, as shown in FIGS. 5A and 5B, the cassette-type clip unit 2 has the coupling plate 37 thereof inserted into the clip-fastening ring 46 from the large-diameter section 46b with the hook 51 of the coupling plate 37 engaged in the base end 47 of the clip 45. Under this condition, a fixing agent 90 such as silicon is filled in the clip-fastening ring 46, whereby the clip 45 and the coupling plate 37 are tacked in the clip-fastening ring 46.

[0050] Now, the operating unit 4 of the tool proper 1 will be described in detail with reference to FIGS. 6 to 13.

[0051] As shown in FIG. 6, the operating unit 4 includes an operating unit proper 5, a first slider 13 slidably mounted in axial direction on the operating unit proper 5, and a second slider 36 slidable in axial direction through a ratchet mechanism with respect to the first slider 13.

[0052] The operating unit 5 has formed over the entire length thereof a through hole 12 terminating with a forward-end opening 10 and a base-end opening 11. This through hole 12 communicates with the inner hole of the lead tube 3 connected to the forward-end opening 10 of the operating unit proper 5. Also, a heat-contraction tube 27 of a comparatively soft material such as silicon is covered over the outer periphery of the forward-end socket 5a of the operating unit proper 5 from the outer periphery of the base end of the lead tube 3 (see also FIG. 2). This is in order to prevent the lead tube 3 from buckling due to an extreme alteration of the hardness at the connection between the lead tube 3 and the operating unit proper 5. The heat-contraction tube 27 functions as a reinforcing member for smoothing the hardness change from the lead tube 3 to the operating unit proper 5.

[0053] The through hole 12 has a small-diameter portion 12a at the forward end thereof and a large-diameter portion 12b occupying a majority of the remaining portions. The small-diameter portion 12a and the large-diameter portion 12b are connected to each other through a tapered hole 12c. The large-diameter portion 12b is formed with such an inner diameter that the forward end of the first slider 13 can be inserted into it. Also, the operating unit proper 5 has formed thereon a lure lock socket 14 onto which an injection cylinder not shown can be removably fitted and which communicates with the large-diameter portion 12b of the through hole 12.

[0054] The operating unit proper 5 has a flange 15 at the base end thereof. As shown in FIG. 7, a mount 94 on which a lid member 6 is adapted to be mounted is formed on the base end surface of the flange 15. Engaging grooves 16, 16 for engagement with the lid member 6 are formed respectively at the ends of the mount 94. Also, an engaging member 17 adapted to engage a release button 7 shown in FIG. 8 is protruded from the base end surface of the mount 94. The engaging member 17 has on the outer surface thereof a side hole 18 communicating with the large-diameter portion 12b of the through hole 12 in the same direction as the grooves 16, 16. This side hole 18 includes a large-diameter hole

portion 18a and a small-diameter hole portion 18b as shown in FIG. 10. Incidentally, the engaging member 17 is located at the center of the flange 15 coaxially with the operating unit proper 5. A base end opening 11 of the through hole 12 is formed at the base end surface of the engaging member 17. As shown in FIG. 7, the lid member 6 presents a shape of a substantially circular disk, and has an end thereof formed with a groove 95 that can accommodate the mount 94 and the engaging member 17. This groove 95 reaches the peripheral edge of the lid member 6. Also, the lid member 6 has a pair of protrusions 22, 22 protruded inward of the groove 95 in mesh with the grooves 16, 16 of the mount 94. Further, the other end surface of the lid member 6 has formed thereon an opening 21 communicating with the groove 95 and adapted to engage the engaging member 17.

[0055] Also, as shown in FIG. 8, the release button 7 includes a rectangular frame 25 adapted to slide in the space formed between the engaging member 17 and the lid member 6 with the operating unit proper 5 and the lid member 6 in an assembled state (the state shown in FIG. 10), and a pin 26 protruded inward of the frame 25. The pin 26 includes a large-diameter portion 26a fitted in the large-diameter hole portion 18a of the side hole 18 of the engaging member 17 and a small-diameter portion 26b fitted in the small-diameter hole portion 18b of the side hole 18. The total length of the pin 26 as assembled on the engaging member 17 is determined in such a manner as to extend a predetermined amount into the large-diameter portion 12b of the through hole 12 of the operating unit proper 5. The amount  $x$  of this extension is desirably given by the relation  $0 \text{ mm} < x \leq 2 \text{ mm}$ .

[0056] In the case where the lid member 6 is assembled on the operating unit proper 5, as shown in FIG. 10, first, the release button 7 is assembled on the engaging member 17, and an O-ring 9 is interposed between the outer peripheral surface of the small-diameter portion 26b of the pin 26 and the peripheral surface of the large-diameter hole portion 18a of the side hole 18. Next, a spring 8 is loaded in a spring mount hole 97 formed in the bottom of the large-diameter portion 26a of the pin 26. Under this condition, the lid member 6 is fitted in the operating unit proper 5. The fitting procedure will be described below.

[0057] First, the protrusions 22, 22 of the lid member 6 are located in the grooves 16, 16 of the operating unit proper 5, and the lid member 6 is then slid from above the operating unit proper 5 along the direction of arrow in FIG. 7. As a result, the grooves 16, 16 come into mesh with the protrusion 22. By the way, in this case, as shown in FIG. 6, the relation  $L > L'$  holds between the distance  $L$  from the base end surface of the flange 15 to the base end surface of the engaging member 17 and the distance  $L'$  from the forward end of the lid member 6 to the forward end of the opening 21 (end surface of the groove 95). The length  $L$  is set about 0.5 mm longer than  $L'$ . Consequently, this dimensional setting and the facings

(bevelings) 23, 24 formed at the starting portion of engagement between the grooves 16, 16 and the protrusion 22 causes the lid member 6 to be progressively deformed while being slid downward of the operating unit proper 5. When the lid member 6 is further slid with respect to the operating unit proper 5 under this condition, the engaging member 17 of the operating unit proper 5 comes to be fitted in the opening 21 of the lid member 6 at the time point when the center of the flange 15 registers with that of the lid member 6. The deformation of the lid member 6 thus is eliminated, so that the protrusions 22, 22 of the lid member 6 come to engage the grooves 16, 16 in longitudinal direction. Also, the engaging member 17 and the opening 21 come to engage each other in diametric direction, and thus the lid member 6 is firmly fixed on the operating unit proper 5.

[0058] Under this assembled condition, a minimum play is allowed in all the parts between the operating unit proper 5 and the lid member 6 thereby to prevent any residual stress from being generated due to the assembly work.

[0059] Also, with the lid member 6 assembled on the operating unit proper 5 in this way, the release button 7 engaged with the engaging member 17 is partially protruded from the peripheral edge of the lid member 6 through the groove 95, while the spring 8 is held in compressed state between the release button 7 and the lid member 6. This spring 8 biases the release button 7 in such a direction that the forward end of the pin 26 is protruded into the large-diameter portion 12b of the through hole 12. As a consequence, depressing the release button 7 against the biasing force, the pin 26 can be relieved out of the large-diameter portion 12b of the through hole 12. In other words, the pin 26 is prevented from protruding into the large-diameter portion 12b of the through hole 12.

[0060] Next, explanation will be made about the first slider 13 and the second slider 36 making up the operating unit 4.

[0061] As shown in FIG. 6, the cylindrical first slider 13 is retractively inserted in the through hole 12 of the operating unit proper 5. An operating tube 28 (base-end coil 32) inserted in the lead tube 3 is connected fixedly by brazing or the like means to the forward end of a metal coupling member 59 screwed to the forward end of the first slider 13 by a screw 60 through the forward-end opening 10 of the operating unit proper 5. The reason why this connecting technique is used is that the operating tube 28 is a coil which if fixed by an adhesive would undesirably expand or contract under the force exerted thereon and could undesirably separate the adhesive. Another reason is that the first slider 13 is made of a resin mold and therefore it is impossible to braze the operating tube 28 directly on the first slider 13. Consequently, the operating tube 28 should best be provisionally fixed by brazing or the like method on the metal coupling member 59 and then the screw 60 of the coupling member 59 is bonded by being forced into the first slider

13.

**[0062]** Also, a compression spring 62 is interposed between the screw 60 of the coupling member 59 and the operating unit proper 5. This compression spring 62 is forced into a spiral groove 61 formed in the outer peripheral surface of the coupling member 59 at the forward end of the screw 60. As a result, according to this configuration, an adhesive is coated also on the compression spring 62 arranged in the spiral groove 61 at the time of the forced-in bonding of the first slider 13 and the coupling member 59, so that bonding work can be performed at the same time between the compression spring 62 and the coupling member 59 on the one hand and between the coupling member 59 and the first slider 13 on the other hand.

**[0063]** Two guide slots 64, 64 are arranged along the length on the outer peripheral surface at the forward end side of the first slider 13. These two guide grooves 64, 64 are disposed at an angular interval of 180 degrees to each other along the peripheral direction. Each guide groove 64 has a width slightly larger than the diameter of the small-diameter portion 26b of the pin 26 of the release button 7 mounted on the operating unit proper 5. The forward end side of the guide groove 64 forms a shallow first guide groove portion 64a, and the base end side thereof constitutes a deep second guide groove portion 64b on both sides of a midway step 99 as a boundary. In this configuration, the pin 26 of the release button 7 is located at the forward end of the first guide groove portion 64a and also at the forward end of the second guide groove portion 64b of one guide groove 64, thereby restricting the amount by which the operating tube 28 is pulled into the lead tube 3 while at the same time restricting the rotation of the first slider 13.

**[0064]** By the way, the compression spring 62 is dimensionally set in such a manner as to hold the compression force between the operating unit proper 5 and the first slider 13 when the pin 26 is placed in the second guide groove portion 64b on the second step and also to release the compression force when the pin 26 is located at the forward end of the first guide groove portion 64a on the first step.

**[0065]** Also, with the pin 26 located on the second guide groove portion 64b, the operating tube 28 is protruded from the forward-end opening of the lead tube 3. If the pin 26 is retracted into the side hole 18 of the operating unit proper 5 by depressing the release button 7 under this condition, the pin 26 disengages from the second guide groove portion 64b so that the biasing force of the compression spring 62 automatically retracts the operating tube 28 into the lead tube 3.

**[0066]** By the way, two guide grooves 64 are provided on the first slider 13 by reason of the fact that while the protrusion 7a of the release button 7 and the pin 26 are structurally located in opposite positions separate by 180 degrees from each other, the user may misunderstand that the pin 26 is located on the protrusion 7a of the release button 7 and thus may erroneously dispose

the first slider 13 at a position 180° opposite with respect to the operating unit proper 5.

**[0067]** Also, as shown in FIG. 2, a first slit 56 is formed along the longitudinal direction on the base end side of the first slider 13. Further, an expansion 13a expanding substantially perpendicular to the length of the first slider 13 from the two sides of the first slider 13 is formed at the forward end side of the first slit 56. This expansion 13a is formed with a second slit 57 perpendicular to the first slit 56. The second slider 36 is mounted movably along the first slit 56, and a rotative operation member 55 fixed as described later on the base end side of the operating wire 33 is arranged rotatably in the second slit 57. This configuration will be described in more detail with reference to FIG. 6.

**[0068]** As shown in FIG. 6, the operating wire 33 extends from the base end opening of the operating tube 28 fixedly connected at the forward end of the coupling member 59. This extended operating wire 33 is rotatably coupled to the second slider 36. Also, a plurality of tubular members 34, 53 are fitted to cover the outer peripheral portion of the operating wire 33 extending from the base end opening of the operating tube 28.

**[0069]** In other words, as shown in FIG. 11, in order to prevent the operating wire 33 from buckling in the neighborhood of the second slider 36, an operating pipe 34 made of a pipe material such as stainless steel is fitted to cover the outer periphery of the extension of the operating wire 33. Further, a cylindrical wire support 35 made of stainless steel or the like material is fitted to cover the outer periphery of the base end of the operating wire 34.

**[0070]** As shown in FIG. 9, the wire support 35 has a small-diameter hole 35a into which the operating pipe 34 can be inserted and a large-diameter hole 35b larger than the small-diameter hole 35a. The operating pipe 34, together with the operating wire 33 inserted into it, is led to the large-diameter hole 35b through the small-diameter hole 35a of the wire support 35, and is folded back together with the operating wire 33 in the large-diameter hole 35b. By caulking the outer peripheral portion where the small-diameter hole 35a of the wire support 35 is located, the wire support 35, the operating pipe 34 and the operating wire 33 are integrally fixed.

**[0071]** By the way, this fixing operation can of course be performed also by soldering. The use of soldering, however, may corrode off the operating wire 33 due to the residual flux or the like. Also, many other problems are posed since such operations are required as the filing for removing extraneous solder and the cleaning process for removing flux. Taking these points into consideration, therefore, the fixing work by caulking is said to be preferable after all.

**[0072]** Also, as shown in FIG. 11, a rotating pipe 53 is fitted to cover the outer periphery of the operating pipe 34 in spaced relationship with the wire support 35. This rotating pipe 53 is made of a pipe material such as brass and has a flat portion 54 over the substantially entire

length thereof. In other words, this rotating pipe 53 has a D-shaped section. Also, a disk-shaped rotative operation member 55 is slidably fitted on the outer periphery of the rotating pipe 53. In this case, a D-shaped through hole 58 having the same sectional shape as the rotating pipe 53 is formed at the central portion of the rotative operation member 55 to permit the turning effort of the rotative operation member 55 to be transmitted to the rotating pipe 53 (hence, also to the operating wire 33). Therefore, the rotative operation member 55 cannot rotate with respect to the rotating member 53. By the way, in the case where the section of the rotating pipe 53 is not D-shaped but is a rectangle or hexagon, by contrast, the shape of the through hole 58 of the rotative operation member 55 of course also assumes a rectangular or hexagonal shape, as the case may be.

**[0073]** Also, nickel, chromium or the like is plated on the surface of the rotating pipe 53. The rotating pipe 53 is fixed on the operating pipe 34 by caulking the base end thereof. Of course, the fixing between the rotating pipe 53 and the operating pipe 34 may alternatively be accomplished by brazing or the like.

**[0074]** The base end side of the operating wire 33 configured by being covered with the operating pipe 34 and the rotating pipe 53 in the above-mentioned manner is projected into the first slit 56 by being retractively inserted into the inner hole 120 of the first slider 13. This base end is fixed on the second slider 36, which is movable along the first slit 56, through the wire support 35. Also, the rotative operation member 55 fitted on the outer periphery of the rotating pipe 53 is arranged in the second slit 57 formed in the expansion 13a of the first slider 53. The rotative operation member 55 is fitted slidably (but not rotatably as described above) on the outer periphery of the rotating pipe 53, and therefore the turning effort of the rotative operation member 55 can be transmitted to the rotating pipe 53 in any state of retraction of the rotating pipe 53. This turning effort is transmitted from the rotative operation member 55 to the rotating pipe 53 to the operating pipe 34 to the operating wire 33 to the hook 30 to the cassette-type clip 2. In other words, by rotating the rotative operation member 55 with the clip device led into the body cavity by way of the endoscope, the direction in which the clip 45 of the cassette-type clip 2 is opened can be remotely controlled from outside the body.

**[0075]** As shown in FIG. 6, the rotative operation member 55 is arranged forward of the area where the second slide 36 slides. This is intended to facilitate the operation on the assumption that the second slider 36 is manipulated by the right hand and rotated by the left hand.

**[0076]** As shown in FIG. 6, the second slider 36 mainly includes two holding members 65, 65 for holding and fixing the wire support 35 mounted at the base end of the operating wire 33, and a cover member 122 for integrally covering the holding members 65, 65 from outside.

**[0077]** Two holding members 65, 65 are used as the same members in order to decrease the product cost. Each holding member 65 includes a tabular sliding section 65a slidable in the first slit 56 of the first slider 13 and a semicircular section 65b located at the base end side of the sliding section 65a. A notch 69 is formed in each sliding section 65a. The two holding members 65, 65 are coupled in such a position that the two notches thereof are in opposed relation to each other. At the same time, the wire support 35 is arranged in the closed space formed by the two notches 69, 69. The operating wire 33 thus can be rotatably fixed on the second slider 36 through the wire support 35.

**[0078]** The sliding section 65a has a relief 70 cut at the forward end thereof, and also has a pawl 71 protruded from the outer surface of the forward end thereof. The cover member 122 and the two holding members 65, 65 are fixed by pressing the coupled pair of the holding members 65, 65 into the inner hole 122a of the cover member 122 from the base end side of the cover member 122. In the process, the pawl 71 of the holding member 65, 65 is pressed in along a groove 72 (see FIG. 13) formed in the inner hole 122a of the cover member 122. This pressing operation is performed by taking advantage of the fact that the forward end of the sliding section 65a is displaced by the relief 70. When the holding members 65, 65 and the cover member 122 come to a predetermined position, the pawl 71 is caught in an engaging section 73 formed at the forward end of the cover member 122, so that the two component parts are fixed on each other.

**[0079]** The semicircular portion 65b of the holding member 65 is formed with a rectangular through hole 75 passing through the semicircular portion 65b in the perpendicular direction from the semicircular flat portion 74. This through hole 75 has arranged slidably therein a ratchet release button 68, an engaging means 66 and a spring 67. The spring 67 is arranged in a state compressed between the engaging means 66 and the inner wall of the second slider 36. The spring 67 causes the engaging means 66 to be pressed against the engaging pawl 76 of the first slider 13, thereby restricting the movement of the second slider 36 toward the forward end of the first slider 13. In other words, the engaging means 66 and the engaging pawl 76 constitute a ratchet mechanism. The ratchet release button 68 is passed through the through hole 75 and the through hole 77 of the cover member 122 communicating with the through hole 75. Upon depression of the ratchet release button 68, the engaging means 66 is pushed up and releases the engagement between the engaging means 66 and the engaging pawl 76.

**[0080]** Also, the clearance between the through hole 75 and the bar-shaped sliding section 68a at the forward end of the ratchet release button 68 located in the first slit 56 is desirably about 0.01 to 0.2 mm. This is by reason of the fact described below.

**[0081]** Specifically, in this clip device, as described

later, the J-shaped hook 51 of the cassette-type clip 2 is extended by pulling the second slider 36 toward the operator, and in this way the cassette-type clip 2 and the clip device proper 1 are separated from each other thereby to retain the cassette-type clip 2 in the affected part. In the process, the force thus far exerted on the second slider 36 is released, so that the second slider 36 abruptly moves toward the operator with the result that the base end of the second slider 36 and the base end of the first slit 56 of the first slider 13 come to strike violently each other. If a large clearance is allowed between the sliding section 68a of the ratchet release button 68 and the through hole 75, on the other hand, the base end of the holding members 65, 65 is undesirably subjected to plastic deformation, and the through hole 75 is crushed, thus preventing the engaging means 66 and the sliding section 68a of the ratchet release button 68 from smooth sliding. In order to prevent such a troublesome situation, the clearance between the sliding section 68a and the through hole 75 is minimized to eliminate the space which otherwise might be available for the plastic deformation of the holding members 65, 65. Even in the case of a violent collision, the holding members 65, 65 thus absorb the impact by elastic deformation, thereby permitting the engaging means 66 and the sliding section 68a of the ratchet release button 68 to smoothly slide. Also, the two holding members 65, 65 are surrounded by the cylindrical cover member 122 to prevent the holding members 65, 65 from being dislocated due to the collision.

**[0082]** By the way, as shown in FIG. 12, the ratchet release button 68 includes a stopper 78 adapted to expand toward the button 68b. By displacing the space 79 inside the stopper 78, the ratchet release button 68 can be fitted in the through hole 75 of the holding members 65, 65. Also, the ratchet release button 68, after being thus fitted, is prevented from coming off as the stopper 78 engages the step 80 of the through hole 75.

**[0083]** By the way, as shown in FIG. 6, an annular handle 105 is provided at the base end of the first slider 13.

**[0084]** Next, the operation of the clip device configured as described above will be explained. First, the first slider 13 of the operating unit 4 is pushed out toward the forward end thereof, whereby the pin 26 is located in the second guide groove portion 64b of the first slider 13 thereby to project the operating tube 28 from the lead tube 3. Under this condition, the cassette-type clip unit 2 is mounted on the hook 30 on the side of the clip device proper 1.

**[0085]** For mounting this clip unit 2, the second slider 36 of the operating unit 4 is slid toward the forward end thereof and the hook 30 at the forward end of the operating wire 33 is projected outside of the operating tube 28. Next, a head 42a of the pin 42 of the hook 3 is fitted in the large-diameter hole 52b of the coupling plate 37 of the clip unit 2, and under this condition the clip unit 2 is pulled toward the forward end. Then, the slot portion

52a of the engaging hole 52 of the coupling plate 37 is fitted on the neck 42b of the pin 42 of the hook 30, and thus is settled in position not to easily come off. Under this condition, the second slider 36 of the operating unit 4 is pulled toward the operator, and the hook 30 is retracted into the coupling ring 29 through the operating wire 33. The coupler 46a of the clip-fastening ring 46 on the side of the cassette-type clip unit 2 is fixedly fitted in the coupling ring 29. As a result, the cassette-type clip unit 2 is loaded in the clip device proper 1.

**[0086]** Next, the first slider 13 of the operating unit 4 is slid toward the operator and thus the operating tube 28 is pulled into the lead tube 3. The operating tube 28 thus is accommodated in the lead tube 3 with the clip 45 closed. The operating tube 28, together with the lead tube 3, is thus led into the vital body cavity through the endoscope channel, after which the first slider 13 of the operating unit 4 is pushed out toward the forward end. The operating tube 28 thus pushed out of the lead tube 3, thereby projecting the clip 45 out of the lead tube 3. In the process, the arms 49a, 49b of the clip 45, which have the inherent tendency of widening open, open widely.

**[0087]** After that, the second slider 36 of the operating unit 4 is pulled toward the operator, and the hook 30 thus is also pulled toward the operator through the operating wire 33. As a consequence, the loosely-fitted portions 48a, 48b of the clip 45 are retracted into the clip-fastening ring 46. Then, as shown in FIG. 14, the loosely-fitted portions 48a, 48b are crushed, with the result that the arms 49a, 49b of the clip 45 open to the widest degree. With the arms 49a, 49b of the clip 45 open widest this way, the rotative operation member 55 is rotated in an arbitrary direction thereby to orient the clip 45 in the desired leg-open direction. If the second slider 36 is returned several ratchets toward the forward end in advance, the operating wire 33 can be more smoothly rotated by the rotative operation member 55. This is by reason of the fact that the operating wire 33 is tensioned in order to open wide the clip 45, and with the friction resistance between the clip unit 2 and the coupling ring 29 increased by this tension, the operating wire 33 is fixed by ratchet. By returning the second slider 36 several ratchets toward the forward end, however, the tension can be released.

**[0088]** After the leg-open direction of the cassette-type clip 2 is set in an optimum direction by this operation, the clip 45 is pressed against the vital tissue 108 requiring the clipping operation. The second slider 36 is pulled toward the operator again, and the operating wire 33 thus pulled also toward the operator. Then the arms 49a, 49b of the clip 45 strike the clip-fastening ring 46, and further are pulled into the clip-fastening ring 46, so that the arms 49a, 49b of the clip 45 are closed and the holders 50a, 50b hold the vital tissue 108 tightly between them.

**[0089]** Pulling the operating wire 33 further toward the operator, the clip 45 is struck deep into the vital tissue



108 as shown in FIG. 15A. At the same time, the hook 51 of the coupling plate 37 is extended as shown FIGS. 15B and 15C and the clip 45 comes off from the coupling plate 37. By the way, the clip-fastening ring 46, which presses the arms 49a, 49b of the clip 45, does not come off from the clip 45 as shown in FIG. 15A and is retained in the body together with the clip 45.

[0090] As described above, with the clip device according to this embodiment, the forward-end treatment section can be rotated without adversely affecting the mechanisms for other than the rotation. Further, rotation can be accomplished in both directions securely without any skip or similar irregularities. As a result, the clipping work is done easily.

[0091] FIGS. 16 to 20 show a second embodiment of the invention. As shown in FIG. 16, according to this embodiment, the only difference from the first embodiment lies in the construction of the second slider and the fixed state of the base end of the wire 33, while the other configurations are identical to those of the first embodiment.

[0092] More specifically, as shown in FIG. 16, the length of the engaging means 66 along the length of the first and second sliders 13, 36 is shorter by about 5 mm than the length of the through hole 75 along the length of the first and second sliders 13, 36. Even with the ratchet mechanism turned on, therefore, the second slider 36 is adapted to move by about 3 to 10 mm, or preferably, by about 5 mm, with respect to the first slider 13.

[0093] Also, a cylindrical wire support 35' made of stainless steel or the like material is fitted on the outer periphery of the base end of the operating pipe 34 in which the operating wire 33 is inserted. Under this condition, the outer periphery of the wire support 35' is caulked as shown in FIGS. 17 and 18, thereby integrally fixing the wire support 35', the operating pipe 34 and the operating wire 33.

[0094] The fixedly-caulking operation is accomplished by a caulking device having a caulking section 102 as shown in FIG. 19. The caulking section 102 includes a recessed support 100 and a protruded portion 101. The side of the wire support 35' is held between the support 100 and the protruded portion 101 to perform the caulking work. Under a caulked condition, as shown in the longitudinal sectional view of FIG. 17, the operating wire 33 and the operating pipe 34 are sided to the support 100 of the caulking section 102. As shown in FIG. 18, the caulking process is effected at two points on the side displaced in the longitudinal direction of the wire support 35'. The caulking operation at the two points is carried out with the caulking section 102 oriented in different directions. In other words, as shown in FIG. 18, the caulking work at the two points increases the strength of securing the operating pipe 34 and the operating wire 33 to each other by means of a corrugation formed thereon. Also, in the case where the outer diameter of the wire support 35' is 2 mm and the outer diameter of the operating pipe 34 about 0.8 mm, the dis-

tance between the two caulking points 91, 91 is desirably about 0.5 mm. This is because an excessively short interval between the two caulking points 91, 91 would cause an excessively bent condition of the operating pipe 34, which in turn would lead to a breakage initiated at the bent part. In the case where the corrugation pitch of the operating pipe 34 and the operating wire 33 is too long, on the other hand, the fixing strength fails to reach a sufficiently high level. By the way, the caulking operation may of course be performed at three or more points. In this case, too, however, adjacent caulking points 91, 91 are required to be caulked in opposite directions.

[0095] With the configuration according to this embodiment, when the rotative operation member 55 is rotated in an arbitrary direction with the arms 49a, 49b of the clip 45 open to the widest degree in order to open the legs of the clip 45 in the desired direction, the second slider 36 is moved about 3 to 10 mm, or preferably about 5 mm, toward the forward end. In this way, the rotative operation member 55 (the operating wire 33) can be more smoothly rotated. This is due to the fact that the tension imposed on the operating wire 33 for opening the legs of the clip 45 (the state shown in FIG. 20A) can be released by moving the second slider 36 by about 3 to 10 mm or preferably by about 5 mm toward the forward end (the state shown in FIG. 20B). Also, this movement of 3 to 10 mm or preferably about 5 mm can be accomplished with the ratchet mechanism turned on.

[0096] As described above, according to this embodiment, the same effect of operation can be obtained as the first embodiment. At the same time, the second slider 36 can be moved by about 3 to 10 mm or preferably by about 5 mm toward the forward end without releasing the ratchet before rotation. The tension exerted on the wire thus can be released safely and securely, thus permitting a smoother rotation.

[0097] Further, since the wire support 35 is caulked in such a manner that the operating pipe 34 and the operating wire 33 are corrugated appropriately, a low-cost fixing arrangement is possible with a high fixing strength.

[0098] FIG. 21 shows a third embodiment of the invention. This embodiment is different from the first embodiment in that the first slider 13 is split into two parts at the base end side of the second guide slot 64b.

[0099] More specifically, the first slider 13 includes a forward-end slider portion 13a adapted to slide in the operating unit proper 5 and connected to the operating tube 28 and a base-side slider portion 13b having a first slit 56 and rotatably coupled to the forward-end slider portion 13a. Also, the operating wire 33 is rotatably connected to the second slider 36 together with the operating pipe 34 fitted to cover the outer periphery thereof. As a consequence, unlike the configuration of the first embodiment, the present embodiment does not include the rotating pipe 53, the rotative operation member 55 and the second slit 57. The other configuration of the

embodiment is identical to that of the first embodiment.  
**[0100]** In this configuration of the present embodiment, rotation of the base-end slider portion 13b with the forward-end slider portion 13a held appropriately can rotate the cassette-type clip unit 2.

### Claims

1. An endoscopic treatment tool adapted to be led into the vital body through the endoscope channel and to operate a treatment section (45) by transmitting the operating force of an operating section (4,13,36,55) at the operator's side to the treatment section, comprising:

a tubular sheath (28) adapted to be inserted into the endoscope channel;  
 rotative operation means (55) arranged on said operating section for rotatively operating said treatment section; and

a rotatable operating wire (33) inserted into said sheath (28) for coupling said treatment section (45) with said rotative operation means (55) and having a torque transmissivity capable of transmitting the rotation torque from the rotative operation means (55) to said treatment section (45),

characterized by further comprising:

a lead tube (3) adapted to be inserted into the endoscope channel, said sheath (28) being inserted in retractively into said lead tube (3);  
 a first slider (13) connected to the base end of said sheath (28) for performing the back-and-forth operation of said sheath (28) with respect to said lead tube (3); and  
 a second slider (36) connected to the base end of said operating wire (33) and engaging said first slider (13) through a ratchet mechanism (66,76) for performing the back-and-forth operation of the operating wire (33) while moving back and forth with respect to the first slider (13).

2. An endoscopic treatment tool according to claim 1, characterized in that said ratchet mechanism (66,76) comprises an engaging pawl (76) formed along the longitudinal direction of said first slider (13), engaging means (66) arranged in said second slider (36) and adapted to engage said engaging pawl (76), a spring (67) for biasing said engaging means (66) with respect to said engaging pawl (76), and a release button (68) for releasing the engagement between said engaging means (66) and said engaging pawl (76) against the biasing force of said spring (67).

3. An endoscopic treatment tool according to claim 2, characterized in that said release button (68) is arranged slidably in said second slider (13), and the clearance between said release button (68) and said second slider (36) in the direction of advance and retraction of said second slider is 0.01 to 0.2 mm.

4. An endoscopic treatment tool according to claim 2, characterized by further comprising tension release means capable of releasing the tension of said operating wire (33) by advancing and retracting said second slider (36) with respect to said first slider (13) while holding said first slider (13) and said second slider (36) engaged by ratchet (66,76).

5. An endoscopic treatment tool according to claim 4, characterized in that engaging means (66) is arranged in said second slider (36), retaining a predetermined clearance.

6. An endoscopic treatment tool according to claim 5, characterized in that said clearance is 4 to 6 mm.

7. An endoscopic treatment tool according to claim 1, characterized in that a reinforcing pipe (34) is externally arranged at the base end of said operating wire (33), a cylindrical support member (35') is externally arranged on the outer periphery of said reinforcing pipe (34), the side of said support member (35') is caulked at least at two points (91) in the longitudinal direction, whereby said operating wire (33), said reinforcing pipe (34) and said support member (35') are integrally fixed, said support member (35') is caught in an engaging section (69) arranged in said second slider (36), whereby said operating wire (33) and said second slider (36) are rotatably coupled to each other.

8. An endoscopic treatment tool according to claim 7, characterized in that said adjacent caulking operations are performed on the opposite sides of said support member (35').

9. An endoscopic treatment tool according to claim 7, characterized in that said support member (35') is caulked by a caulking member (100,101,102) which comprises a first arm (101) having a protrusion and a second arm (100) having a recess, located opposite to the protrusion, for receiving the protrusion, the first arm and the second arm being rotatably connected to each other.

10. An endoscopic treatment tool according to claim 7, characterized in that the longitudinal distance by which adjacent caulking points (91) are spaced from each other is 0.4 to 0.6 mm.

11. An endoscopic treatment tool according to any one of claims 1 to 10, characterized in that said treatment section (45) is a clip (45) rotatable with respect to said sheath (28) and adapted to widely open due to the inherent widely-opening tendency thereof, said clip (45) being adapted to replaceably engage a hook (30) mounted at the forward end of said operating wire (33) and to close by being retracted into a holding tube (46) mounted replaceably at the forward end of said sheath (28) by the retracting operation of said operating wire (33).

### Patentansprüche

1. Endoskopisches Bearbeitungswerkzeug, das dafür ausgelegt ist, durch den Endoskopkanal in den lebenden Körper eingeführt zu werden und einen Bearbeitungsabschnitt (45) zu betätigen, indem die Betätigungskraft von einem Betätigungsabschnitt (4, 13, 36, 55) an der Seite des Bedieners zu dem Bearbeitungsabschnitt hin übertragen wird, wobei das endoskopische Bearbeitungswerkzeug aufweist:

eine rohrförmige Hülle (28), die dafür ausgelegt ist, in den Endoskopkanal eingeführt zu werden;

eine Betätigungseinrichtung (55) zum Drehen, die an dem Betätigungsabschnitt angeordnet ist, um den Bearbeitungsabschnitt drehbar zu betätigen; und

einen drehbaren Betätigungsdraht (33), der in die Hülle (28) eingesetzt ist, um den Bearbeitungsabschnitt (45) mit der Betätigungseinrichtung (55) zum Drehen zu koppeln und der ein Drehmomentübertragungsvermögen aufweist, das in der Lage ist, das Rotationsdrehmoment von der Betätigungseinrichtung (55) zum Drehen an den Bearbeitungsabschnitt (45) zu übertragen,

ferner gekennzeichnet durch:

ein Führungsrohr (3), das dafür ausgelegt ist, in den Endoskopkanal eingesetzt zu werden, wobei die Hülle (28) zurückziehbar in dem Führungsrohr (3) eingesetzt ist;

eine erste Gleiteinrichtung (13), die mit dem Basisende der Hülle (28) verbunden ist, um die Zurück-und-Vor-Betätigung der Hülle (28) bezüglich des Führungsrohrs (3) durchzuführen; und

eine zweite Gleiteinrichtung (36), die mit dem Basisende des Betätigungsdrahts (33) verbunden ist und mit der ersten Gleiteinrichtung (13) durch einen Sperrklinkenmechanismus (66, 76) in Eingriff steht, um die Zurück-und-Vor-

betätigung des Betätigungsdrahts (33) durchzuführen, während sie sich zurück und vorwärts bezüglich der ersten Gleiteinrichtung (13) bewegt.

2. Endoskopisches Bearbeitungswerkzeug nach Anspruch 1, dadurch gekennzeichnet, daß der Sperrklinkenmechanismus (66, 76) aufweist:

eine Eingriffsklinke (76), die entlang der Längsrichtung der ersten Gleiteinrichtung (13) ausgebildet ist, eine Eingriffseinrichtung (66), die in der zweiten Gleiteinrichtung (36) angeordnet ist und dafür ausgelegt ist, mit der Eingriffsklinke (76) in Eingriff zu treten, eine Feder (67) zum Vorspannen der Eingriffseinrichtung (66) bezüglich der Eingriffsklinke (76), und einen Freigabeknopf (68) zum Lösen des Eingriffs zwischen der Eingriffseinrichtung (66) und der Eingriffsklinke (76) gegen die Vorspannkraft der Feder (67).

3. Endoskopisches Bearbeitungswerkzeug nach Anspruch 2, dadurch gekennzeichnet, daß der Freigabeknopf (68) verschiebbar in der zweiten Gleiteinrichtung (13) angeordnet ist, wobei der Zwischenraum zwischen dem Freigabeknopf (68) und der zweiten Gleiteinrichtung (36) in der Richtung des Vorschiebens und des Zurückziehens der zweiten Gleiteinrichtung 0,01 bis 0,2 mm beträgt.

4. Endoskopisches Bearbeitungswerkzeug nach Anspruch 2, ferner gekennzeichnet durch eine Spannungslöseeinrichtung, die in der Lage ist, die Spannung des Betätigungsdrahts (33) durch Vorschieben und Zurückziehen der zweiten Gleiteinrichtung (36) bezüglich der ersten Gleiteinrichtung (13) zu lösen, während die erste Gleiteinrichtung (13) und die zweite Gleiteinrichtung (36) durch die Sperrklinke (66, 76) in Eingriff gehalten werden.

5. Endoskopisches Bearbeitungswerkzeug nach Anspruch 4, dadurch gekennzeichnet, daß die Eingriffseinrichtung (66) in der zweiten Gleiteinrichtung (36) angeordnet ist, wobei ein vorbestimmter Zwischenraum beibehalten wird.

6. Endoskopisches Bearbeitungswerkzeug nach Anspruch 5, dadurch gekennzeichnet, daß der Zwischenraum 4 bis 6 mm beträgt.

7. Endoskopisches Bearbeitungswerkzeug nach Anspruch 1, dadurch gekennzeichnet, daß ein Verstärkungsrohr (34) außen an dem Basisende des Betätigungsdrahts (33) angeordnet ist, daß ein zylindrisches Haltebauteil (35') außen an dem Außenumfang des Verstärkungsrohrs (34) angeordnet ist, daß die Seite des Haltebauteils (35') zumindest an zwei Punkten (91) in der Längsrichtung verstemmt ist, wodurch der Betätigungsdraht (33), das Verstär-

- kungsrohr (34) und das Haltebauteil (35') einstückig fest verbunden sind, und daß das Haltebauteil (35') in einem Eingriffsabschnitt (69) in der zweiten Gleiteinrichtung (36) verstemmt ist, wodurch der Betätigungsdraht (33) und die zweite Gleiteinrichtung (36) drehbar miteinander gekoppelt sind. 5
8. Endoskopisches Bearbeitungswerkzeug nach Anspruch 7, dadurch gekennzeichnet, daß benachbarte Verstemmungsvorgänge an entgegengesetzten Seiten des Haltebauteils (35') durchgeführt werden. 10
9. Endoskopisches Bearbeitungswerkzeug nach Anspruch 7, dadurch gekennzeichnet, daß das Haltebauteil (35') durch ein Verstemmungsbauteil (100, 101, 102) verstemmt wird, das einen ersten Arm (101) mit einem Vorsprung und einen zweiten Arm (100) mit einer Vertiefung aufweist, die gegenüber dem Vorsprung zum Aufnehmen des Vorsprungs angeordnet ist, wobei der erste Arm und der zweite Arm drehbar miteinander verbunden sind. 15 20
10. Endoskopisches Bearbeitungswerkzeug nach Anspruch 7, dadurch gekennzeichnet, daß der Abstand in Längsrichtung, durch den benachbarte Verstemmungspunkte (91) voneinander beabstandet sind, 0,4 bis 0,6 mm beträgt. 25
11. Endoskopisches Bearbeitungswerkzeug nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß der Bearbeitungsabschnitt (45) eine Klammer (45) ist, die bezüglich der Hülle (28) drehbar ist und dafür ausgelegt ist, aufgrund ihrer inhärenten Öffnungstendenz sich weit zu öffnen, wobei die Klammer (45) dafür ausgelegt ist, mit einem Haken (30), der an dem vorderen Ende des Betätigungsdrahts (33) angebracht ist, lösbar in Eingriff zu treten und sich zu schließen, indem sie durch die zurückziehende Betätigung des Betätigungsdrahts (33) in ein Halterohr (46) gezogen wird, das lösbar an dem vorderen Ende der Hülle (28) angebracht ist. 30 35 40

#### Revendications

1. Outil de traitement endoscopique adapté pour être conduit à l'intérieur du corps vital par l'intermédiaire du canal d'endoscope et pour opérer une section de traitement (45) en transmettant la force d'opération d'une section d'opération (4, 13, 36, 55) du côté de l'opérateur à la section de traitement, comprenant :

une gaine tubulaire (28) adaptée pour être insérée dans le canal endoscopique ;  
un moyen d'opération rotatif (55) disposé sur

ladite section d'opération pour opérer de manière rotative ladite section de traitement ; et un fil d'opération rotatif (33) inséré dans ladite gaine (28) pour coupler ladite section de traitement (45) audit moyen d'opération rotatif (55) et comportant un couple de transmissivité capable de transmettre le couple de rotation du moyen d'opération rotatif 55 à ladite section de traitement (45),

caractérisé en ce qu'il comprend en outre :

un tube en plomb (3) adapté pour être inséré dans le canal endoscopique, ladite gaine (28) étant insérée de manière rétractive dans ledit tube en plomb (3) ;

un premier coulisseau (13) connecté à l'extrémité de base de ladite gaine (28) pour réaliser l'opération de va et vient de ladite gaine (28) par rapport audit tube en plomb (3) ; et

un deuxième coulisseau (36) connecté à l'extrémité de base dudit fil d'opération (33) et mettant en prise ledit premier coulisseau (13) par l'intermédiaire d'un mécanisme d'encliquetage (66, 76) pour réaliser l'opération de va et vient du fil d'opération (33) tout en reculant et avançant par rapport au premier coulisseau (13).

2. Outil de traitement endoscopique selon la revendication 1, caractérisé en ce que ledit mécanisme d'encliquetage (66, 76) comprend un cliquet de mise en prise (76) formé le long de la direction longitudinale dudit premier coulisseau (13), un moyen de mise en prise (66) disposé dans ledit deuxième coulisseau (36) et adapté pour se mettre en prise avec ledit cliquet de mise en prise (76), un ressort (67) pour appliquer ledit moyen de mise en prise (66) contre ledit cliquet de mise en prise (76), et un bouton de relâchement (68) pour relâcher la mise en prise entre ledit moyen de mise en prise (66) et ledit cliquet de mise en prise (76) contre la force d'application dudit ressort (67). 45

3. Outil de traitement endoscopique selon la revendication 2, caractérisé en ce que ledit bouton de relâchement (68) est disposé de manière coulissable dans ledit deuxième coulisseau (13), et le jeu entre ledit bouton de relâchement (68) et ledit deuxième coulisseau (36) dans la direction d'avance et de recul dudit deuxième coulisseau est de 0,01 à 0,2 mm. 50

4. Outil de traitement endoscopique selon la revendication 2, caractérisé en outre en ce qu'il comprend un moyen de relâchement de tension capable de relâcher la tension dudit fil d'opération (33) en avan-

- çant et en retirant ledit deuxième coulisseau (36) par rapport audit premier coulisseau (13) tout en maintenant en prise ledit premier coulisseau (13) et ledit deuxième coulisseau (36) par l'encliquetage (66, 76). 5
5. Outil de traitement endoscopique selon la revendication 4, caractérisé en ce que le moyen de mise en prise (66) est disposé dans ledit deuxième coulisseau (36) retenant un jeu prédéterminé. 10
6. Outil de traitement endoscopique selon la revendication 5, caractérisé en ce que ledit jeu est de 4 à 6 mm. 15
7. Outil de traitement endoscopique selon la revendication 1, caractérisé en ce qu'un tube de renforcement (34) est disposé de manière externe au niveau de l'extrémité de base dudit fil d'opération (33), un élément de support cylindrique (35') est disposé de manière externe sur la périphérie externe dudit tube de renforcement (34), le côté de l'élément de support (35') est calfeutré en au moins deux points (91) dans la direction longitudinale, d'où il résulte que ledit fil d'opération (33), ledit tube de renforcement (34) et ledit élément de support (35') sont fixés de manière solidaire, ledit élément de support (35') est saisi dans une section de mise en prise (69) disposée dans ledit deuxième coulisseau (36), d'où il résulte que ledit fil d'opération (33) et ledit deuxième coulisseau (36) sont mutuellement couplés de manière rotative. 20 25 30
8. Outil de traitement endoscopique selon la revendication 7, caractérisé en ce que lesdites opérations de calfeutrage adjacentes sont réalisées sur les côtés opposés dudit élément de support (35'). 35
9. Outil de traitement endoscopique selon la revendication 7, caractérisé en ce que ledit élément de support (35') est calfeutré par un élément de calfeutrage (100, 101, 102) qui comprend un premier bras (101) présentant une protrusion et un deuxième bras (100) présentant un creux, situé à l'opposé de la protrusion, pour recevoir la protrusion, le premier bras et le deuxième bras étant connectés l'un à l'autre de manière rotative. 40 45
10. Outil de traitement endoscopique selon la revendication 7, caractérisé en ce que la direction longitudinale par laquelle les points de calfeutrage adjacents (91) sont espacés mutuellement est de 0,4 à 0,6 mm. 50
11. Outil de traitement endoscopique selon l'une quelconque des revendications 1 à 10, caractérisé en ce que ladite section de traitement (45) est une pince (45) rotative par rapport à ladite gaine (28) et 55

adaptée pour s'ouvrir large, en raison de la tendance de large ouverture inhérente à celle-ci, ladite pince (45) étant adaptée pour être mise en prise de manière remplaçable avec un crochet (30) monté au niveau de l'extrémité avant dudit fil d'opération (33) et pour se fermer en étant rétracté dans un tube de maintien (46) monté de manière remplaçable au niveau de l'extrémité avant de ladite gaine (28) par l'opération de retrait dudit fil d'opération (33).

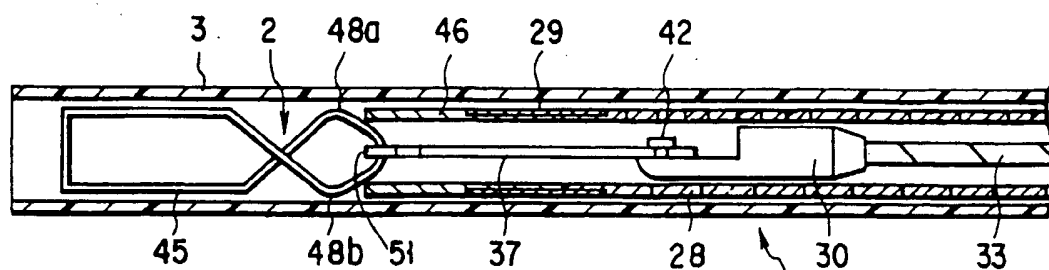


FIG. 1A

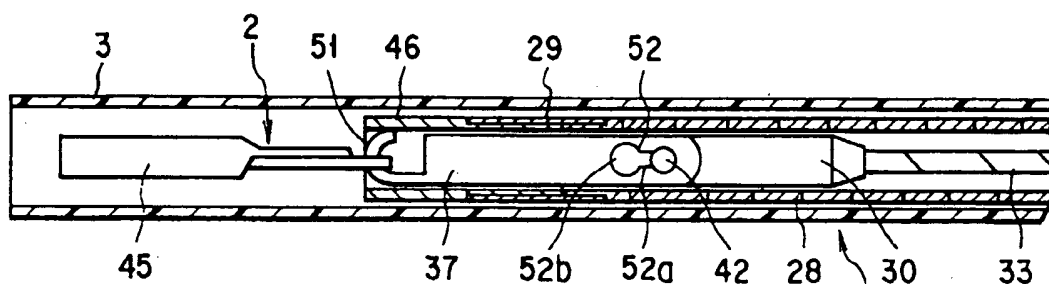


FIG. 1B

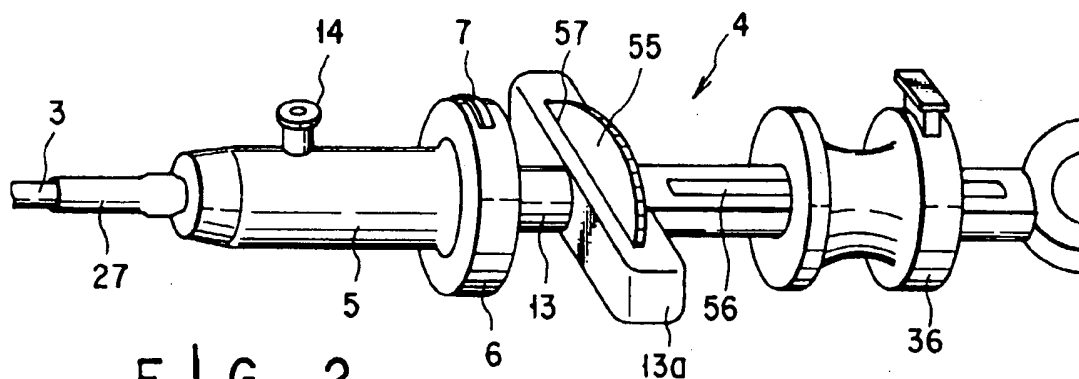


FIG. 2

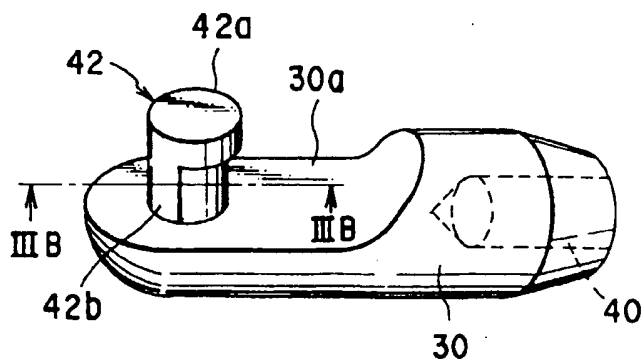


FIG 3A

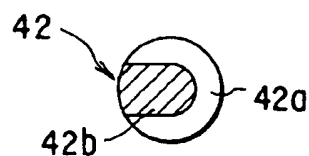
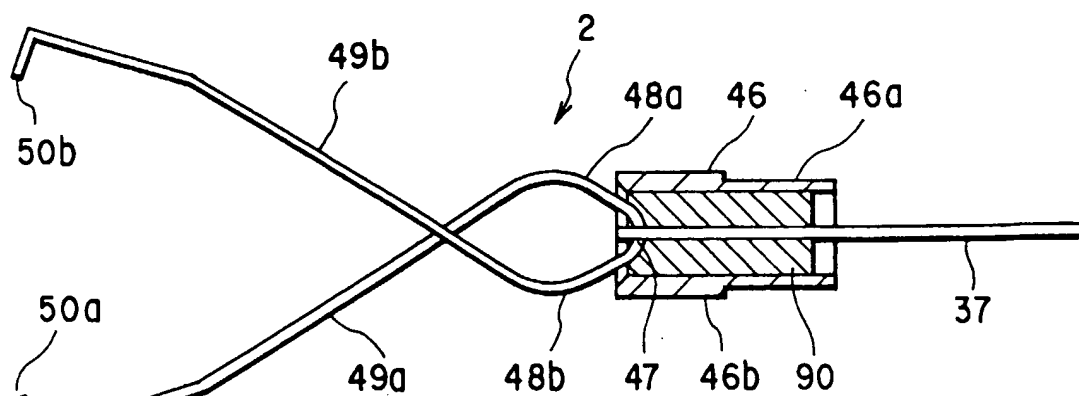
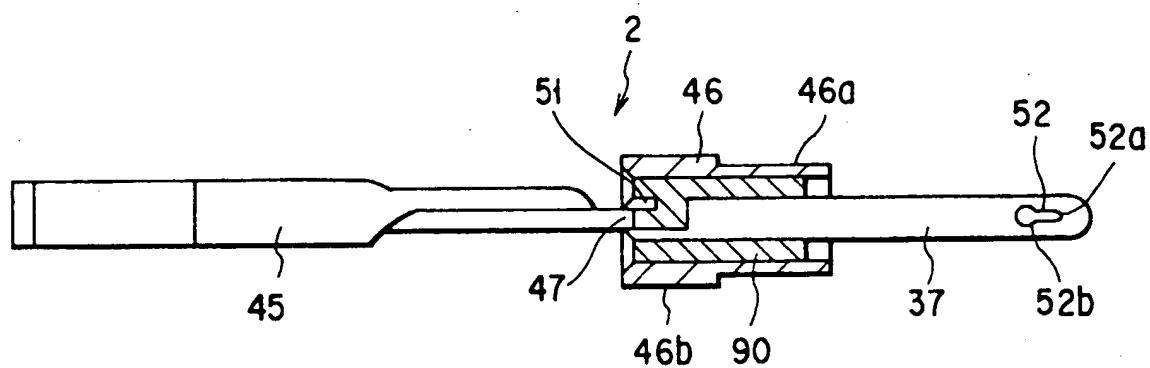
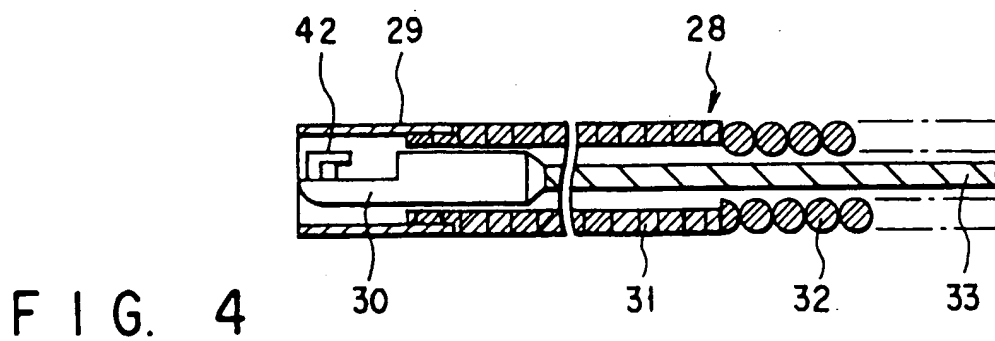
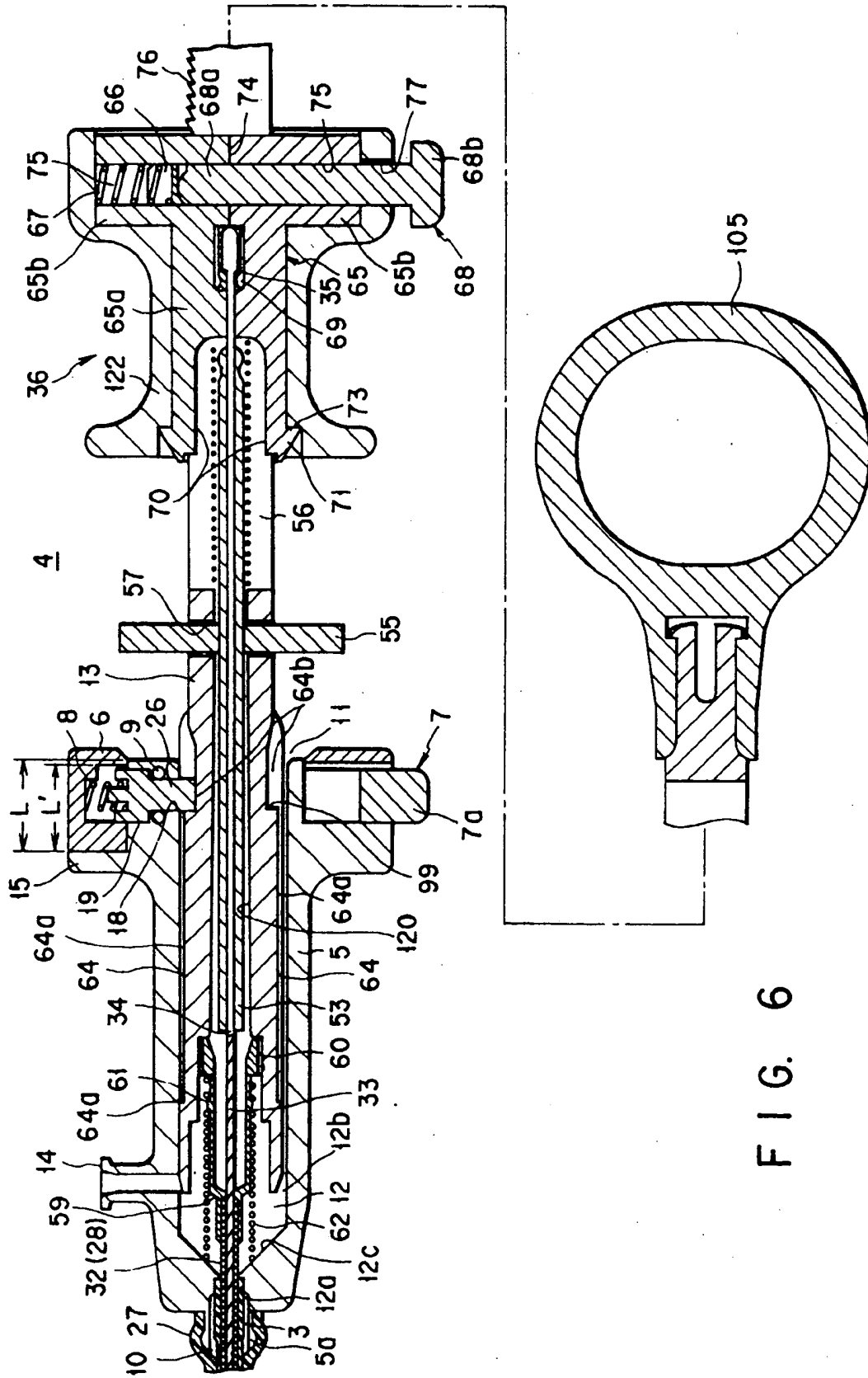


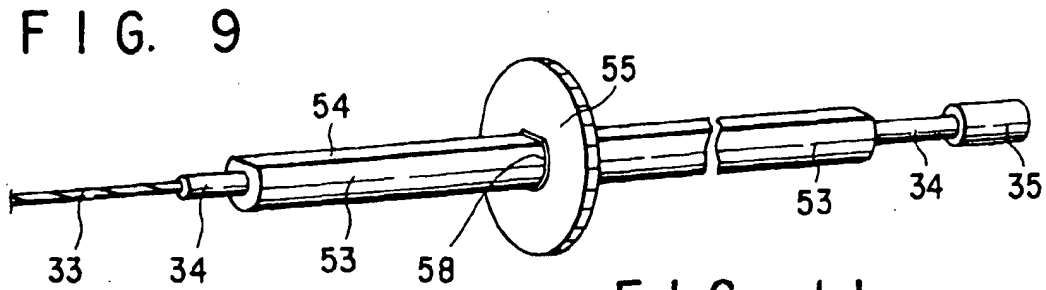
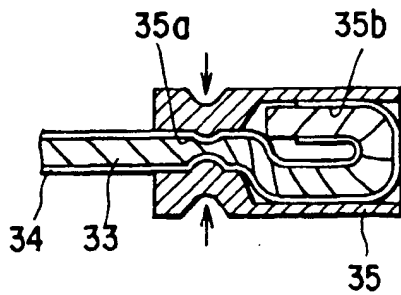
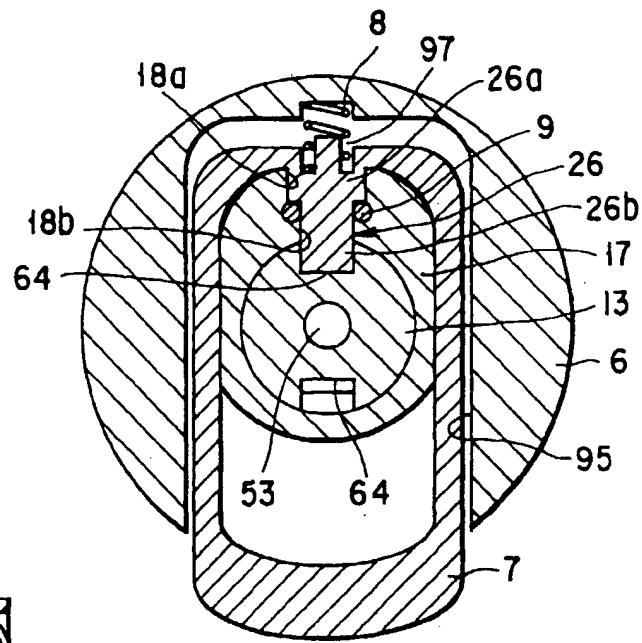
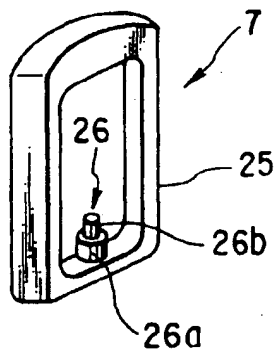
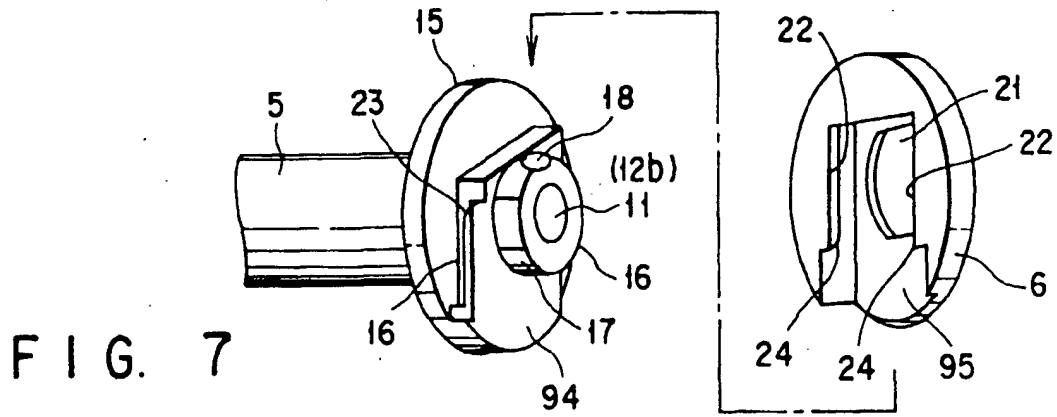
FIG. 3B





616





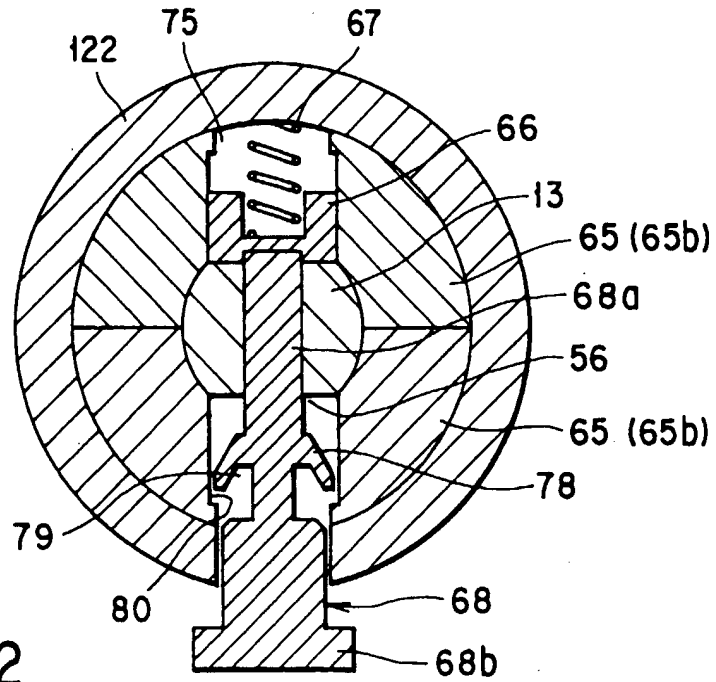


FIG. 12

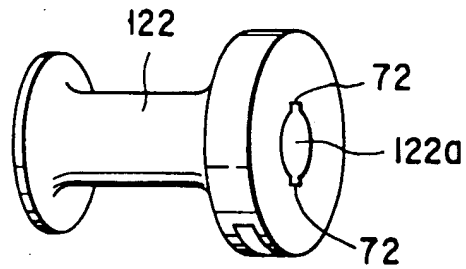


FIG. 13

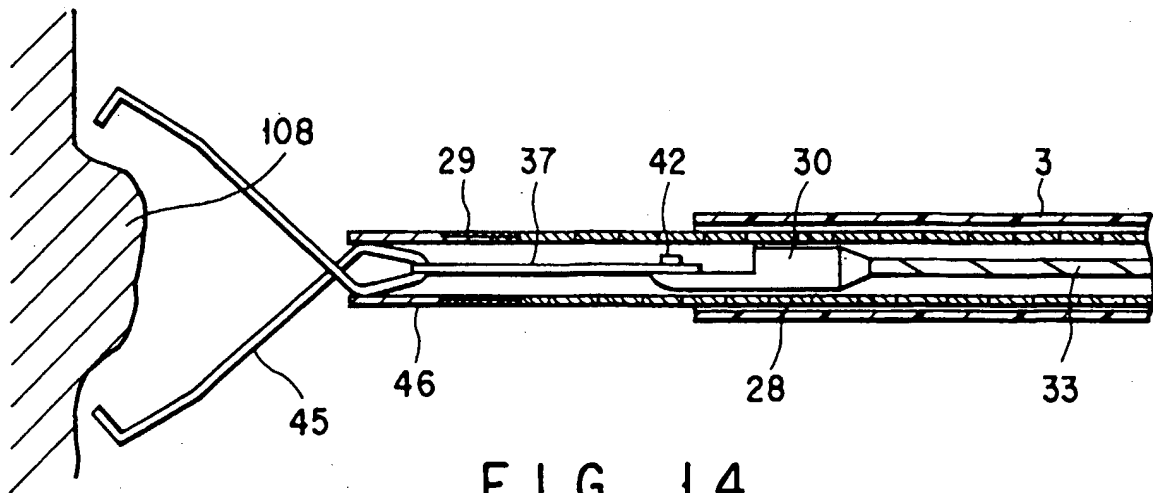


FIG. 14

FIG. 15A

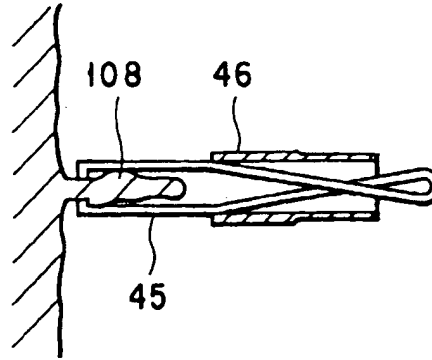


FIG. 15B

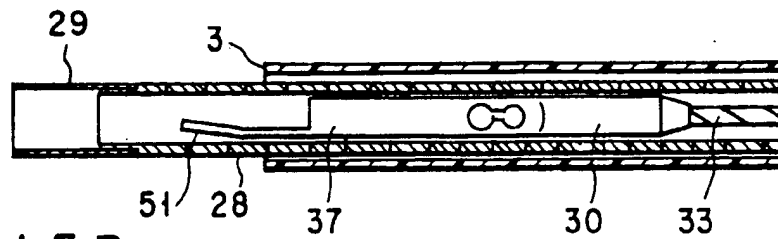


FIG. 15C

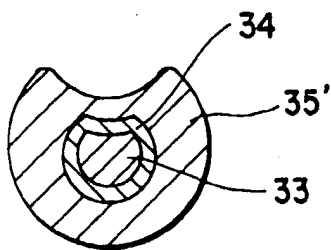
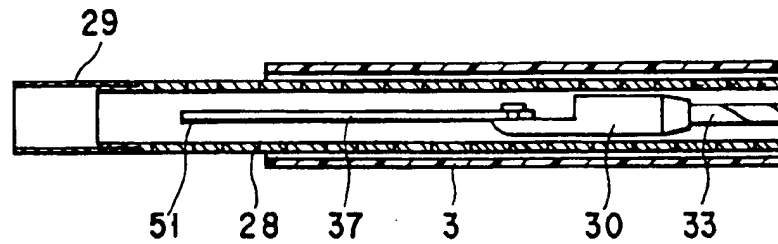


FIG. 17

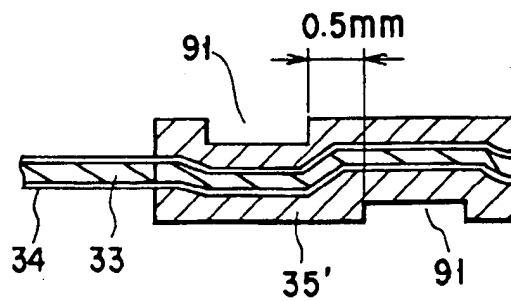


FIG 18

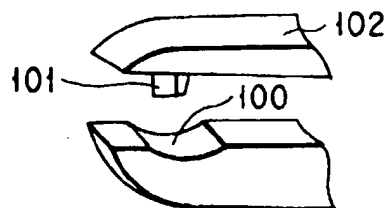


FIG. 19

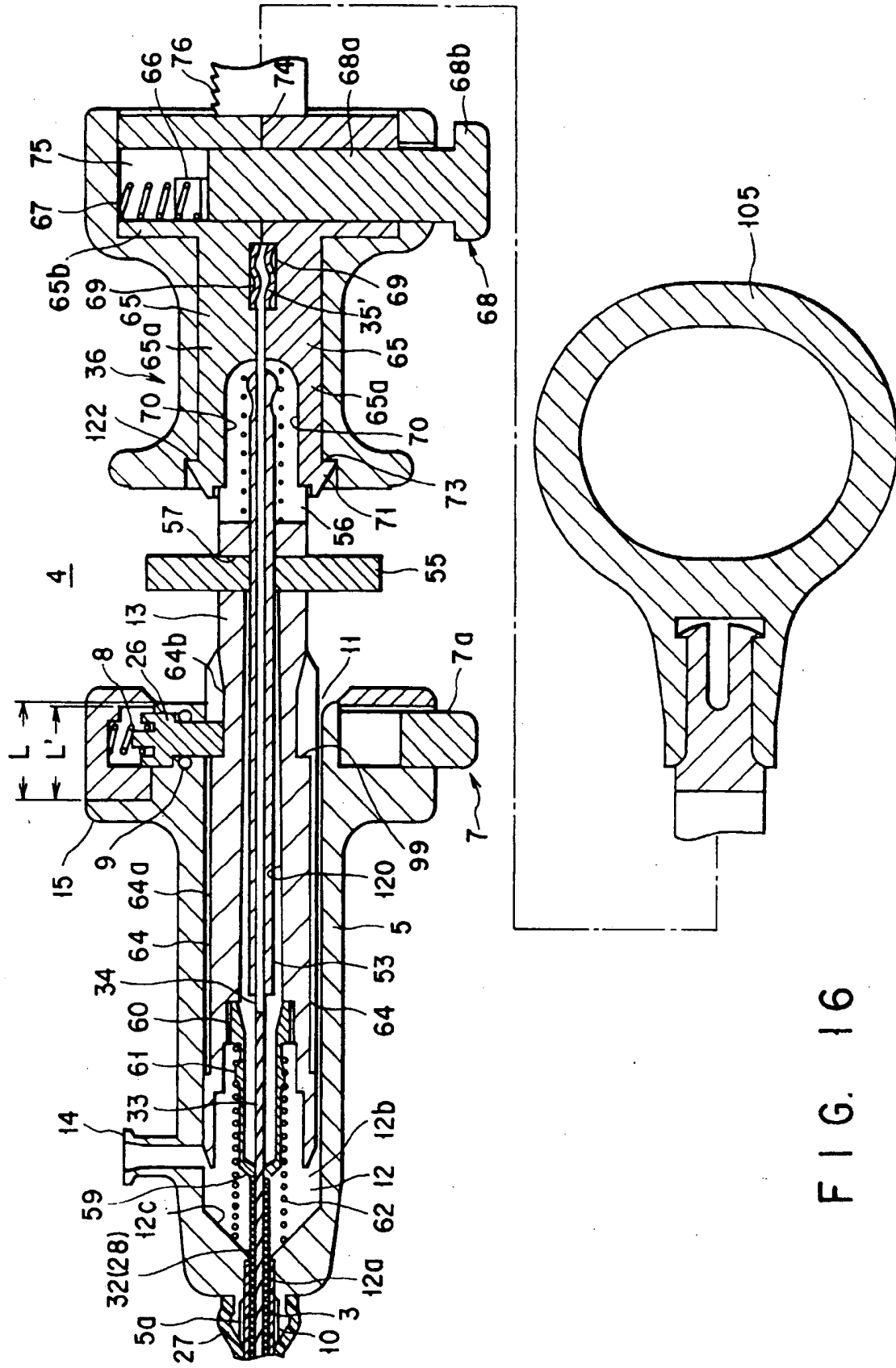
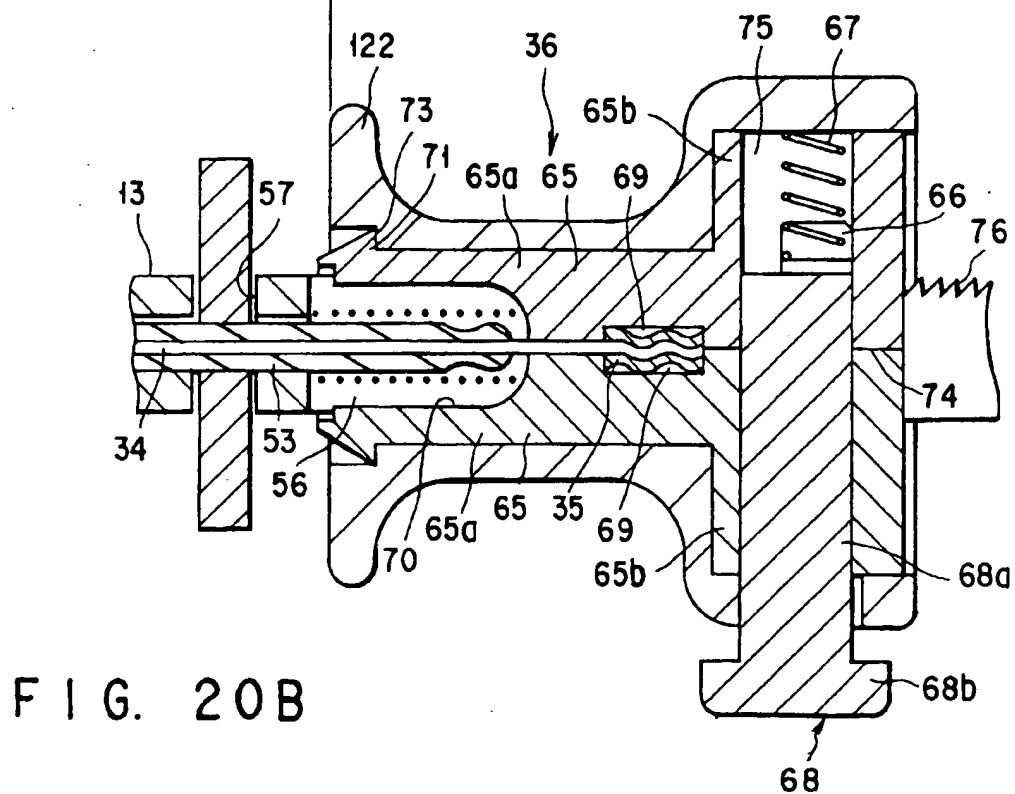
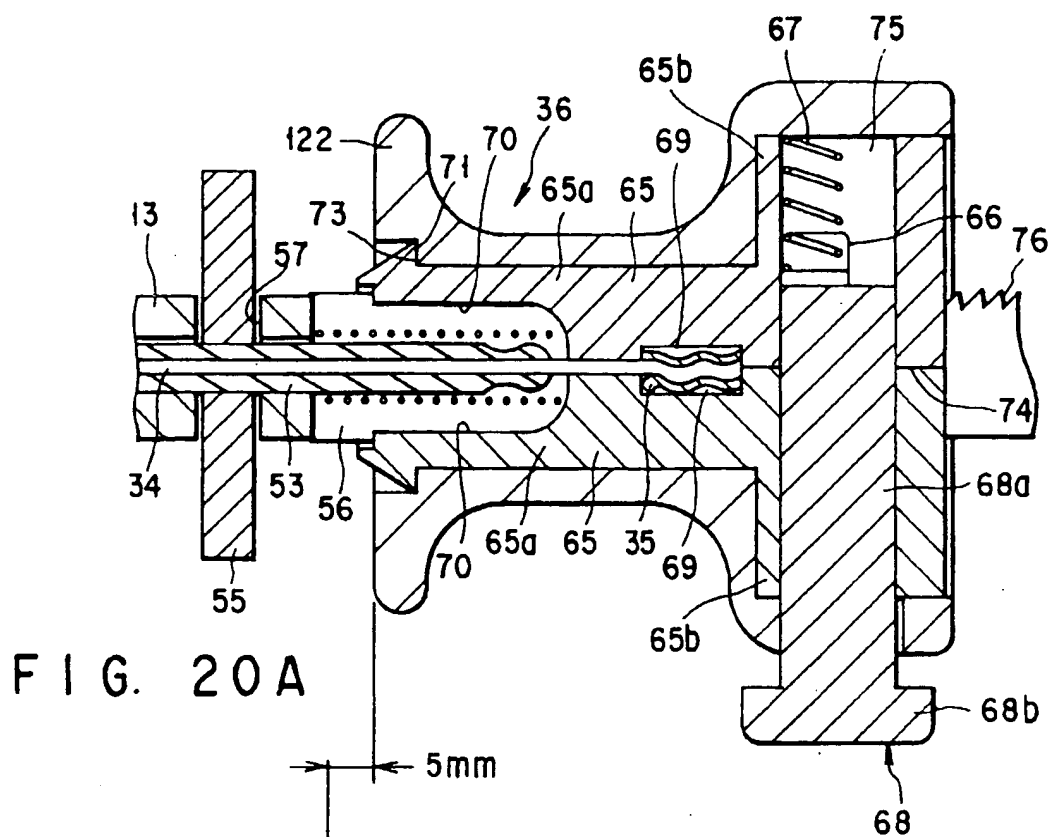


FIG. 16



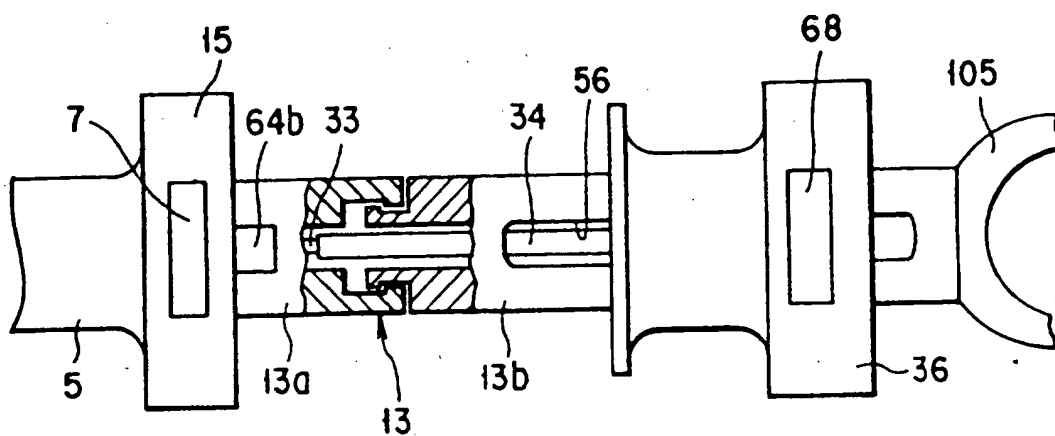


FIG 21

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☒ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**

THIS PAGE BLANK (USPTO)